Provide a Vessel to Conduct Observations and Deploy Sound Source for a Behavioral Response Study of Cetaceans off Southern California in 2011

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LONG-TERM GOALS

The long term goal of the SOCAL Behavioral Response Study is to determine how cetaceans respond to naval sounds, specifically mid-frequency sonar, to better evaluate impacts and develop strategies for mitigation. SOCAL-11 was the second year of this proposed 5-year study. The goal of this specific grant was to provide a vessel to serve as an observational platform and as a base of operations for a sound source and also support for chartering a vessel for use of a towed array to be used in the Behavioral Response Study conducted off Southern California in summer 2011. Other components of this work were included in other separate grants to the various groups involved in the collaborative study and this report addresses just the vessel to serve as a base of operations and the primary platform for the observation and sound source.

OBJECTIVES

This was the second year of the proposed 5-year SOCAL Behavioral Response Study for southern California which began in 2010 (SOCAL-10) to examine the impacts of anthropogenic sounds on local marine mammal species and represents a collaborative effort among a number of parties including Cascadia, Southall Environmental Associates, Woods Hole Oceanographic Institute (WHOI), Southwest Fisheries Science Center (SWFSC), Naval Undersea Warfare Center (NUWC), and Scripps Institution of Oceanography (SIO). Similar studies have been conducted at the AUTEC range and are currently underway in the Mediterranean Sea, all built around a model in which species of interest are fitted with the suction cup-attached tags to record exposure to sound and detailed data on underwater behavior in reaction to these sounds. These efforts have included behavioral observation from both the tag deployment vessel and the source vessel, and in some cases passive acoustic monitoring via an instrumented range, a towed array, or both. Overall objectives of the SOCAL BRS are to obtain new data on the response of a variety of species of marine mammals to Navy sonar to aid the Navy and NOAA in assessing the impact of these activities and ways they might be mitigated.

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APPROACH

The overall SOCAL-BRS involved a collaboration of a number of parties and a number of different components, this report is for the grant that funded several components of the project, primarily a vessel (Figure 1) from which to conduct the following:

1. Visual observations to sight target and non-target species and monitor behavior during the planned two legs of experimental operations in July-September 2011
2. Provide a platform from which to operate a sound source for use in the BRS
3. Serve as a base of operations for small boat operations to sight animals and deploy tags as well as conduct photo-ID
4. Provide housing and food for up to 15 personnel participating in the BRS during the two experimental legs planned for SOCAL-11.

Additionally as part of this project two other components were funded:

1. Provide platforms and an observer for operation of Passive Acoustic Monitoring (PAM) to be operated by Southwest Fisheries Science Center (Figure 2).
2. Purchase two satellite tags for deployment on cetaceans and to aid in BRS operations and tracking of animals.

The field effort was conducted in 2011 and involved the charter of the vessel Truth out of Santa Barbara, California. Similar to prior BRS studies, the overall goal of the BRS effort will be successful acoustic playbacks on tagged species of interest to document behavioral changes associated with exposure. Goals during this second year include:

- Expend the sample size of deployments and playbacks obtained in 2010 with additional deployments and playbacks on target species in 2011.
- Add acoustic monitoring with a towed array from a sailboat to improve detection, deployment, and tracking of beaked whales in areas other than the San Clement SOAR range. Towed array was operated by SWFSC.
- Add monitoring of blue whale prey distribution for improved understanding of blue whale movements.
- Expand the sample size on several odontocete species including beaked whales and Risso's dolphins.

To achieve this end, operations in 2011 would be conducted in three phases (Scout, Leg 1, and Leg 2). While this configuration is similar to 2010, one major change was that all three phases were to be conducted with the primary vessel (*Truth*) as the base of operations (Figure 1). This vessel was chosen to meet the following requirements:

- Area of operations to extend from Moro Bay to San Diego and offshore to include waters west of San Clemente and around San Nicolas and Catalina Islands

- Cruising speed of at least 10 knots and range of 400 nmi of more.
- Operations generally involve daylight ops (12 hours) but transits occurring at night as needed to either return to a sheltered area or harbor or shift to a new area. Occasional night operations tracking a tagged whale.
- Most overnights will be spent either in harbor, anchored, or drifting with up to half the nights underway most of the night either transiting or tracking a whale.
- Fuel usage averaging 200 gal/day (adequate for average of 100 nmi per day travel) included in charter with additional fuel charged as a surcharge.
- Ability to put 3 observers on top of wheelhouse with unobstructed visibility forward and to the sides with a 3-4 foot railing added for safety with canvas to provide wind break on railing and intercom or other means of easy communication with bridge and sundeck area behind bridge.
- Carry at least 150 gallons of gasoline (in bladders, drums, or fuel caddies) in a location that allows refueling RHIBs at night while at anchor or at dock (gasoline itself will be paid for by research group)
- Provide adequate bunks for 15 personnel plus crew.
- Provide adequate food and cook to feed number of people specified above including accommodating special dietary needs.

Figure 1. Vessel Truth chartered under this grant for leg 1 and 2 of the SOCAL-11 BRS showing scientific crew that based on the vessel and observation platform added above the bridge. Truth served as the observation platform, sound source deployment vessel, and base of operations for the work.

Figure 2. Sailboat Jenny Lane charterd for Leg 2 of the SOCAL-11 BRS with towed PAM operated by SWFSC.

WORK COMPLETED

The SOCAL-11 BRS was completed successfully in three phases in 2011:

- Scouting leg involving the *Truth* and one RHIB from 15-26 July 2011 (14 July set up)
- Leg 1 involving the *Truth*, 2 RHIBs, and PAM sailboat *Green Dragon* from 29 July to 7 August 2011
- Leg 2 involving the *Truth*, 2 RHIBs, and Pam sailboat *Jenny Lane* from 17-30 September 2011

Support for *Truth* in Leg 1 and Leg 2 as well as the PAM sailboat came from this grant. Overall the work completed during these legs was more successful than had been anticipated. The platform *Truth* chartered under this grant met all the requirements and was an outstanding platform that helped make the cruise as successful as it was. I allowed the BRS to be conducted over wide-ranging areas with a flexible itnirary to best take advantage of weather openings and encounters with different species (Fiigure 3). We again utilized the excellent observation platform that was constructed above the brige for this project and served as an excellent sighting platform. The sailboat PAM work was successfully conducted by SWFSC using the charters. This aided in the key success with beaked whales on leg 2, where a tag was successfully deployed and playback conducted on a Cuvier's beaked whale (Figure 4). The speed of the sailboat was slower than the other platforms due to it's limitations as well as the need to avoid interference with the PAM and reduced their ability to operate with the other platforms especially on leg 1.

Additionaly two satellite tags for use on the BRS were purchased under this grant. One was successfully deployed on a Risso's dophin during the BRS and the other was unfortunately lost during a second deployment attempt where the tag did not attach.

While results of the observations, tag deployments, and playbacks completed will be more appropriately covered under reports for other components of the overall BRS project but some of the key accomplishments of the work completed are briefly covered below.

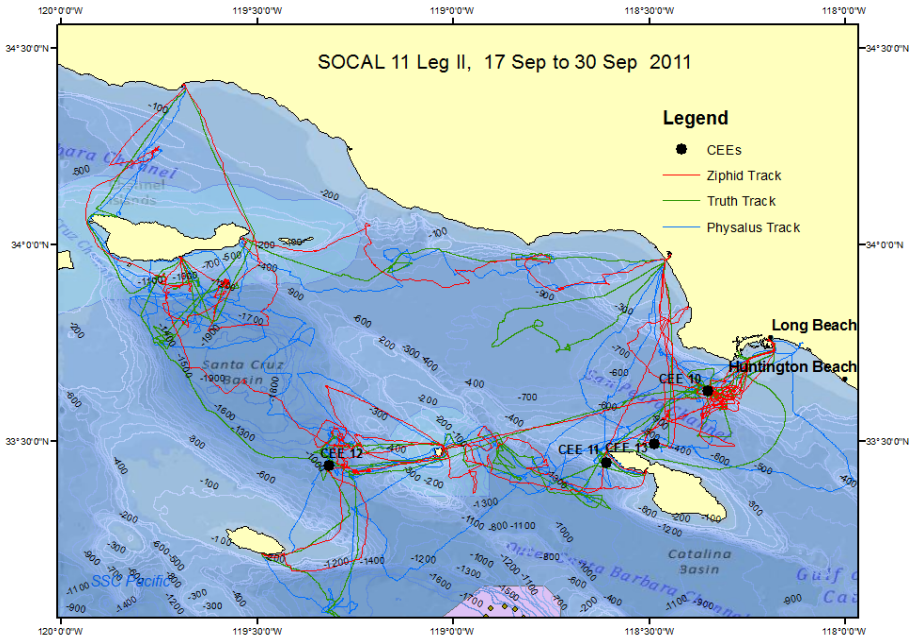

Figure 3. Map of survey effort and Controlled Exposrue Experiments in Leg 2 of the SOCAL-11 BRS.

Figure 4. RHIB approaching group of Cuvier's beaked whales shortly before succseesful deployment of a Dtag and playback on 24 September 2011.

RESULTS

This was the first year of an anticipated 5-year study with this grant representing just one component of a larger collaborative effort. Results of the Behavioral Response Study will be the focus of analysis in coming months under other grants. Analysis and reporting will be being conducted under other grants and continued studies that are part of the Behavioral Response Study.

IMPACT/APPLICATIONS

Like SOCAL-10, the SOCAL-11 effort demonstrated a successful model for conducting BRS studies and showed that both the BRS team, the region, and the methods employed were ideal and achieved a much higher level of success than had been anticipated. The study promises to provide important new data on the behavioral response of cetaceans to Navy sonar and other sounds.

TRANSITIONS

Work will be continuing on ths anticipated 5-year project. Enough data was gathered in 2010 and 2011 to allow analysis and presentation of some of the findings to scientific conferences including the Biennial Conference on the Biology of Marine Mammals in Tampa in November and December 2011. Several publications are in difference stages of preparation.

RELATED PROJECTS

This specific grant was to provide vessels to serve as an observational platform and as a base of operations for a sound source to be used in the SOCL-11 Behavioral Response Study conducted off Southern California in summer 2011. Other components of this work were included in other separate grants to the various groups including Cascadia Research, Southall Environmental Associates, Woods Hole Oceanographic Institute (WHOI), Southwest Fisheries Science Center (SWFSC), Naval Undersea Warfare Center (NUWC), and Scripps Institution of Oceanography (SIO). Similar studies have been conducted at the AUTEC range and are currently underway in the Mediterranean Sea, all built around a model in which species of interest are fitted with the suction cup-attached tags to record exposure to sound and detailed data on underwater behavior in reaction to these sounds.